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*Primary cancer of the Fallopian tube.*

By ALBAN DORAN.

[With Plates XIII and XIV.]

M<sup>RS.</sup> B—, aged 48, was admitted into the Samaritan Free Hospital, under the care of Mr. J. Knowsley Thornton, in February, 1888. Mr. Malcolm prepared the following notes of the case:—"Married twenty-three years (family history unimportant), one child born twenty-two-years ago, no confinement since. Admitted with a tender, hard, mobile tumour in the right groin, two inches in diameter, reaching to level of anterior superior iliac spine. *Pelvic examination.*—Cervix small, feels healthy, lies far back, points backwards. Tumour of groin is very closely connected with right cornu of uterus. The period had previously been always regular, little pain, much show. Twelve months ago it began to diminish. Last period August, 1887."

For three years the patient had been subject to a watery, inoffensive, and occasionally sanious vaginal discharge, which often contained small pieces of membranous material. For this the patient consulted Dr. Amand Routh in October, 1886. In January, 1887, he dilated the cervix, introduced a curette, and scraped away about two drachms of a red fungous growth from the fundus. At that time no pelvic tumour could be detected. A fortnight later an attack of pelvic inflammation occurred, with swelling of the left leg and left labium majus. This complication may, as Mr. Thornton suggested, have been caused by irritation of the malignant growth, already developing though too small for detection. Every surgeon knows that malignant tumours are very intolerant

of operation in their vicinity. As the symptoms and pain subsided, a tumour was discovered, rising to the right above the pubes. The tumour grew slowly and the patient lost flesh.

On March 1st, 1888, Mr. Thornton operated. The abdominal walls were fat, and bled freely on section; there was no free fluid in the peritoneal cavity. The course of the operation is thus described by the operator:—"Tube exposed, much distended, soft and elastic, punctured with fine trocar, then with aspirator. Only a little ill-smelling bloody serum escaped, with fragments like those coming from the vagina. Punctures closed by square-headed forceps and corrosive sublimate lotion freely used. Large forceps put on to the tube close to the uterus. Then the outer part of the tube, which had curled inwards over the ovary and behind the uterus, was gradually separated from both, the adhesions being very fine, so that I could only tear away part of the ovary, leaving the rest sticking to the broad ligament. When the tube was sufficiently freed, I transfixed and tied in two halves, but on cutting away was obliged to put on several pairs of forceps, as vessels spouted. I then put another ligature round the whole, transferring large forceps to distal side before tying ligatures. The end of the tube left in the stump was patent, but seemed fairly healthy; one small portion of the diseased tissue was removed on the cotton-wool dipped in corrosive sublimate lotion used for cleaning it out" (The "diseased tissue" was probably decolourised clot, with which the uterine end of the removed portion was stuffed.)

"I then with much difficulty removed the left tube and part of a small cystic ovary, the adhesions being much denser than on the right side, and some separate ligatures being required for adhesions deep in the pelvis. The uterus was not so large as I thought at first, and seemed fairly firm and healthy, so that I rather doubted if there was any of the growth in it." A glass drainage-tube was introduced with some difficulty, as the pelvis was blocked with firmly adherent intestine. The patient made a good recovery, the temperature never rising above  $101.2^{\circ}$ ; the tube was removed on March 4th. She was sent back to the convalescent ward on March 7th, and discharged at the end of the third week of the same month. [In August, 1888, she was in good health.]

The mucous membrane of the left tube was thickened, but free from any morbid growth, as was likewise the ovary. The right

tube was of the characteristic legume form observed in most tubes when dilated beyond a certain degree, but there were traces of two convolutions on its inner third. The tube, when collapsed, measured about five inches in length.<sup>1</sup> I cut away a large piece of the anterior wall immediately after the operation, and took it at once to the Physiological Laboratory, St. Bartholomew's Hospital, where Dr. Vincent Harris kindly prepared for me some sections. A reddish fluid, with broken-down particles of solid matter, escaped from the tube as it was opened. Almost the entire surface of the interior of the tube was covered with soft and highly villous growth, of a bright red colour when fresh, no normal mucous membrane being left. Only about one inch and a half (Plate XIII, fig. 1, *b*), nearest the uterine end, remained free from the new growths; here the channel of the tube was firmly packed with partially decolourised clot, and the mucous membrane was thickened and rigid. The tube was completely obstructed at its outer extremity, and no trace of the fimbriæ remained.

The serous coat of the tube was little, if at all, thickened; it did not show clearly on section; thus *e*, fig. 1, is the muscular coat and not the peritoneum. The muscular coat was thick and free from any cavities, like, for example, the sinuses observed in Martin's "follicular salpingitis."<sup>2</sup> It was invaded at certain places (fig. 1, *d*) by the growth, which nowhere perforated the serous coat. The submucous tissue was very conspicuous when the specimen was fresh; it was thickened to the extent of from one eighth to one quarter of an inch at many points; it has become thinner and quite opaque through the action of spirit. In some places (*d'*) the submucous tissue was invaded; this of necessity was the case wherever the growth had reached the muscular coat.

The broad ligament was in parts nearly one quarter of an inch in thickness, and infiltrated with the new growth (*g*). It was shortened and crumpled up, as in chronic inflammatory diseases of the uterine appendages. A thin-walled cyst projected from its posterior surface.

The ovary was almost spherical, and measured in its long diameter about one inch and three quarters. It was converted into five or six pale, fleshy lobes, each about one quarter of an inch

<sup>1</sup> The specimen is now in the Museum of the Royal College of Surgeons, No. 4584D.

<sup>2</sup> "Ueber Tubenerkrankung," 'Zeitschr. f. Geburtsh. u. Gynäk.,' vol. xiii, pt. 2.

in diameter, soft and yellowish-white in colour. Between these lobes were recent blood-clots, possibly effused on the tightening of the ligature during operation. No trace of normal ovarian tissue could be detected. A piece of the ovary was preserved, when fresh, for section.

The microscopic appearances of the sections taken from the anterior wall of the tube are shown in Plate XIII, fig. 2. The portion of tube-wall prepared for the microscope was nearly one quarter of an inch thick, and on naked-eye examination it was seen to be partly invaded by the new growth. Throughout the section were wide spaces filled with large cells (*a*). The nuclei of these cells were also of large size. Some were undergoing division; in some the "signet ring" appearance was seen. The fibres of the stroma did not appear to pass between individual cells, nor could I detect any connection between any cell and the stroma. In the immediate neighbourhood of every collection of large cells was a highly alveolar tissue consisting of a network of more or less stout fibres enclosing very elongated spaces, which were stuffed with small round-cells (fig. 2, *b*). In some parts of the sections the network was composed of the muscular fibres of the middle coat of the tube (*c*), and muscle-cells were even to be seen amidst the collections of large cells, as is indicated in fig. 2. At first I thought that the trabecular tissue *b* represented scirrhus cancer, the masses of large cells indicating the softer part of the malignant growth, but after careful comparison I noted that the small round-cells were probably not cancerous at all, but were connective-tissue cells, produced by a process of proliferation observed in the neighbourhood of a cancer in any organ. In this opinion I was confirmed by Mr. Butlin, Mr. Bowlby, Mr. D'Arcy Power, and others who are experienced in general pathology, and Dr. Griffith, who has prepared a large series of specimens illustrating the progress of uterine cancer, informs me that tissue like *b* in fig. 2 is constantly seen around the collections of epithelial cells in that disease.

There were several other remarkable appearances in the sections. Bundles of muscular fibres, divided transversely, bore a strong resemblance to collections of epithelial cells on superficial examination. Some parts of the sections were highly vascular. The peritoneal surface of each section showed some remarkable minute crypts, which were in some cases bifurcated, and I noted secondary



bifurcations in a few of these follicular depressions. The deepest were hardly a fiftieth of an inch in depth. These crypts were remarkable, as they caused the serous surface to be taken at a first glance for the mucous surface, and, moreover, on naked-eye examination the serous coat appeared perfectly smooth. Possibly the depressions were caused by irregular contraction of the subjacent tissue, due to the morbid infiltration. Not a trace of the normal mucous surface could be found in the infected part of the tube, in fact, it had been entirely replaced by the morbid growth, and the microscope proved what was almost as plain to the naked eye. Deeper down, towards the serous coat, the disease was certainly less advanced. Here I detected two or three well-formed tubules, lined with columnar ciliated epithelium and surrounded by a wide area of large cells (Plate XIV, fig. 3). In this area (*b*) some of the flat cells were arranged as though they represented tubules choked with epithelium. This would indicate that the disease arose from the epithelium of glands connected with the tubal mucous membrane. The cancer-tissue resembled gland-cancer elsewhere rather than epithelioma of a mucous or other free surface.<sup>1</sup> I shall presently have occasion to refer to this subject.

In sections prepared from the ovary I detected the same appearances as in the tube, that is to say, there were extensive collections of large flat cells (Plate XIV, fig. 4, *c*) surrounded by trabeculæ in which the connective-tissue cells were undergoing proliferation (fig. 4, *a*). In other parts I fancied at first that I could trace groups of round-cells, each cell being connected by a process to meshes of apparently retiform tissue, which surrounded the entire group. But on further consideration, and examination of the sections with Mr. Eve, I agreed with him that the "small round-cells" were probably large nuclei, the apparently retiform tissue representing vacuolation of protoplasm, such as is seen in cancer. In some of the clusters of epithelial cells this process of vacuolation was not so advanced, but had already produced round or oval holes (fig. 4, *d, d*) with more or less regular outlines. In the trabeculæ, although, as already stated, round-cells (fig. 4, *a*) predominated, I

<sup>1</sup> In a recently published memoir, "Ueber den primären Krebs des Ileum," by Dr. Otto Lubarsch ('Virchow's Archiv,' Band exi, Heft 2, February, 1888, Tafeln viii, ix), the author demonstrates that primary cancer of the ileum arises in Lieberkühn's glands. According to his drawings that local form of cancer closely resembles cancer of the tube in its microscopic characters.

found occasional clusters of small spindle-cells (fig. 4, *b*), which possibly represent the spindle-celled tissue of medullary carcinoma figured and described in S. W. Gross's 'Practical Treatise on Tumours of the Mammary Gland,' fig. 23, p. 134 in the 1880 edition.

I have above described what I observed, and I do not think that there can be much doubt that the morbid growth in this case was cancer and not sarcoma.

The clinical and pathological evidence tends to prove that the tube was the primary seat of disease. Considering that there was vaginal discharge for three years, much broken-down material escaping till the date of operation, that the uterus was scraped with a curette, and that fourteen months later it was found free from disease, whilst the tube contained not only a new growth but also fluid and broken-down matter resembling the discharge, that new growth was certainly tubal and not uterine. The ovary was cancerous, but evidence was against its being the original seat of disease. The history of the discharge favoured the view that the tube had been involved for a long time. The growths within the tube were well developed, the tube being consequently much enlarged. On the other hand, the ovary, although entirely converted into a mass of new growth, was still small, as though but recently invaded. Had the tumour detected by Dr. Routh early in 1887 been ovarian, the ovary would have formed a very large mass of malignant disease by March, 1888, for solid malignant ovarian tumours grow very quickly. The tube is ever slow to become invaded in primary cancer or sarcoma of the ovary, and when attacked it is usually the serous coat which is first involved, so that the surface of the tube appears studded with little white knobs. This I have observed several times. Winckel figures a characteristic specimen in his handbook. In the largest true cancerous tumour which I ever examined, the tube was deeply sunk between two lobes of the tumour, but quite uninvolved in the disease. Schröder noted that the tube in carcinoma of the ovary remains for a long time intact.

I can find but two undoubted cases of primary malignant disease of the Fallopian tube recorded in recent medical literature, and in one the growth was described as sarcoma. Dr. Martin, of Berlin, informed me in January that he had operated on two cases of carcinoma of the tube, and had given the specimens to his assistant,

whose description of them will, I understand, be shortly published. Bruckmüller found medullary cancer in the walls of a bitch's tube. In Scanzoni's case of cancer of the left tube and right ovary, the disease probably began in the ovary, as that organ was "the size of a fist," whilst the tube was "stretched to the thickness of a man's thumb," almost reversing the proportions in the case exhibited this evening. As Scanzoni observed, the case proved that cancer of the Fallopian tubes does not always arise from the contiguity of those organs with diseased neighbouring structures.

In the most recent special treatises on tubal affections by Hennig,<sup>1</sup> Bandl,<sup>2</sup> and Schröder,<sup>3</sup> malignant disease of the tumour is spoken of as though it were without exception secondary, Scanzoni's case being held as doubtful. Dr. Winter<sup>4</sup> has recently described a case of primary carcinoma of the ovary where the tube was obstructed and dilated. A lobulated cancerous mass, almost the size of a walnut, had grown from the ovary, through the tubal wall. It had become polypoid, bearing a thin pedicle and spreading out in the ampulla, the walls of which it had caused to atrophy. The ovarian tumour was the "size of a small fist." As Winckel<sup>5</sup> has already pointed out, secondary cancer of the tube is rare in uterine cancer, as the part of the uterus which is the most frequently attacked is that which lies farthest from the tube. ~

The first of the two undoubted cases of primary malignant disease is described by Dr. Senger, of Breslau, in the 'Centralblatt für Gynäkologie,' Jahrgang x, 1886, page 601. The patient, aged 51, died of diabetes, and there were no clinical symptoms of pelvic disease during life. Both tubes were involved, the left more than the right. There were two oval dilatations of each tube, with a less dilated segment between. Papillary masses grew from the tubal mucous membrane, especially in the two dilatations. The largest masses were the least markedly papillomatous. In the left tube there were larger soft growths, not papillomatous, and there

<sup>1</sup> 'Die Krankheiten der Eileiter; &c.,' 1876.

<sup>2</sup> "Die Krankheiten der Tuben," Billroth and Luecke's 'Deutsche Chirurgie,' 1886.

<sup>3</sup> 'Ziemssen's Cyclopædia of the Practice of Medicine,' vol. x.

<sup>4</sup> "Bericht ueber die Verhandlungen der Gesellschaft für Geburtshülfe und Gynäkologie zu Berlin," 'Zeitschrift für Geburtsh. u. Gynäk.,' Band xiv, Heft 2, 1888, p. 559.

<sup>5</sup> "Lehrbuch der Frauenkrankheiten,' 1886.

was a secondary deposit in Douglas's pouch. Dr. Senger believed that the growths were small round-celled sarcomata. But, in a polypoid growth in one of the dilatations he found "collections of tubes lined with a single layer of cylindrical epithelium and surrounded partly by true sarcoma tissue, partly by new connective tissue rich in nuclei." He stated that the origin of this glandular growth was uncertain, but thought that the gland-tubes might have been derived from the parovarium, which was closely incorporated with the outer wall of this second cyst. It is difficult to understand how parovarian tubes could have forced their way through the walls of the Fallopian tube. The "collections of tubes" rather suggest the appearance seen in my specimen far from the parovarium (Plate XIV, fig. 3). I regret that the account of Dr. Senger's case was published without illustrations. Some readers may not feel certain that the growths were sarcomatous and not carcinomatous. The irregular dilatation of the tubes in this case was remarkable; it should be borne in mind in future researches on the distinctions between suspected sarcoma and carcinoma of the tube.

The second case of primary malignant disease was certainly cancerous. It occurred in Dr. Martin's practice and is described by Dr. Orthmann in the same volume of the 'Centralblatt für Gynäkologie' as Dr. Senger's case, at page 316, and, like that case, is unfortunately published without any illustrations. The patient was forty-six years old and had only been married for three years. About a year and a half before operation she had suffered from typhoid fever, and during convalescence she noticed lumps forming in the abdomen. A firm tumour, "the size of a child's head," was found to the right of the uterus; a smaller swelling was detected to the left, somewhat posteriorly. Ascitic fluid in small amount was found in the peritoneal cavity. The smaller swelling was caused by encysted serous perimetritis; its clear fluid contents were emptied and drained through the vagina. The right tumour was removed. It consisted of the thickened, tortuous right tube and two pus-cavities. The ostium of the tube communicated with one of these cavities, which Dr. Orthmann described as ovarian abscesses. The mucous membrane of the tube was covered with soft papillary growths, filling the lumen at the abdominal end, where they were numerous. Each growth consisted of a stroma of connective tissue, including numerous nests of epithelial cells.



Here and there involutions of epithelium were detected passing into the stroma. The tube, when tapped at the beginning of the operation, yielded "a litre and a half of green pus," no doubt derived from the abscess.

I must here note the evidence, derived from the present case as well as from Drs. Senger's and Orthmann's, that malignant disease of the tube may result from a degeneration of papillomata of the tubal mucous membrane. Dr. Amand Routh informs me that papillomatous material came away in the discharges, when he scraped out the uterus over a year before the operation. In the two cases which I have quoted the growths were partly or entirely papillary. However, I failed to trace any signs of malignancy in either of the specimens of papilloma of the tube which I have exhibited before the Society (October, 1879, and February, 1888), and the first as well as the second case is still living. The first case ('Transactions,' vol. xxxi) resembles Dr. Orthmann's in one respect, for in both the ostium of the tube remained unobstructed so that the escape of morbid secretion caused in the former ascites and hydrothorax, in the latter abscess in the neighbourhood of the ovary. In the case of primary cancer exhibited this evening there was no dropsy, but this complication would have developed had the ostium remained open after the appearance of the morbid growth in the tube. The cancer most probably extended to the ovary, not through the ostium, but between the layers of the broad ligament, which was infiltrated with new growth (fig. 1, *g*). When the attack of inflammation set in, at the end of January, 1887, the tube was possibly studded like the uterus with soft, fungous growths, partially papillomatous, which subsequently underwent malignant degeneration. In this sense, cancer of the tube might represent an extreme and secondary result of chronic disease of the appendages, of which a more evident result is tubo-ovarian cyst or even papilloma of the tube, as I have already endeavoured to demonstrate in the course of this session ('Transactions,' vol. xxxix). The tubular bodies (fig. 3) might be developed from the deep involutions which abound in papillomatous outgrowths. I have already shown that they could not be of parovarian origin, as Senger suggested in his case.

Whether the growths arose from papillomata or direct from the mucous membrane, I believe that it is most probable that the tubular bodies in fig. 3 were originally developed from the glands

of the tubal mucous membrane. As I have already noted, the character of the cancer tends to prove this theory. I have no doubt whatever that Fallopian tube glands exist. Hennig and Bland Sutton<sup>1</sup> have both demonstrated their existence in our species after long and careful observation.

The relation of the appearance of this growth to the menopause is a question of some interest. The last menstrual period was in August, 1887. The patient was forty-eight, but the tumour had already appeared. Hence it is possible that the menopause was hastened through the debility caused by the growth of the tumour. It must be noted, however, that Dr. Senger's case was fifty-one years old, and Dr. Orthmann's forty-six. Considering, then, the ages of all three cases, we may suspect, though we can come to no decision on evidence so scanty, that there is some distinct relation between the menopause and the appearance of malignant disease of the Fallopian tube.

*May 1st, 1888.*

<sup>1</sup> "The Glands of the Fallopian Tubes and their Function," by J. Bland Sutton, F.R.C.S., 'Trans. Obstet. Soc.,' vol. xxx. "The so-called rugæ of these tubes are really glandular diverticula, whose function is to secrete an albuminous material comparable to the albumen of an egg."



## DESCRIPTION OF PLATES XIII AND XIV.

To illustrate Mr. Alban Doran's paper on Primary Cancer of the Fallopian Tube.

From drawings by Mr. H. R. W. Lewin.

### PLATE XIII.

FIG. 1.—A considerable portion of the anterior part of the wall of the tube has been removed to display the extent of the disease. *a*. Uterine end of the tube divided at the operation. A black bristle has been passed through it and along the channel of the tube. *b*. Portion of the tube near the uterine end, free from growths. *c c c* Masses of cancerous growth springing from the inner surface of the posterior part of the tube. *d d*. New growth invading the muscular coat, *e e*, which is elsewhere more or less free from disease. At *d'* a very solid deposit lies in the submucous tissue. *f*. The ovary converted into a mass of tumour substance. *g*. Cut surface of the broad ligament, which is infiltrated with new growth.

FIG. 2.—Section of cancerous growth invading the anterior part of the wall of the tube, as at *d*, fig. 1. ( $\frac{1}{8}$ " obj.)

*a a*. Part of a group of large polymorphous cells. *b*. Part of a trabecula bounding the group of cells showing small-cell infiltration. *c c c*, Muscle-cells indicating remains of the muscular coat of the tube.

### PLATE XIV.

FIG. 3.—Tubular structure surrounded by cells, seen in another part of the same section. *a*. The tubule lined with cylindrical ciliated epithelium. *b b*. Large cells surrounding the tubule; they are arranged somewhat spirally and prolonged outwards into the stroma at *c c*. Further on at *d* are larger cells. Some of the cells, *b*, are arranged as though they were inside tubules choked by proliferation of epithelium. ( $\frac{1}{8}$ " obj.)

FIG. 4.—Section from the firmest part of the ovary (fig. 1, *f*). *a*. Trabecula infiltrated with small cells. *b b*. Trabecula bearing small spindle-cells. *c c c*. Part of a large collection of epithelial cells showing large spaces (*d d*) formed by vacuolation. The "signet-ring" appearance is indicated in some of the cells. ( $\frac{1}{8}$ " obj.)



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